data may be transmitted from the user interface **14** to the intermediate transceiver **6600** and from the intermediate transceiver **6600** to the fluid delivery device **10**;

[0498] Control signals to change the operating parameters of the device **10** may be transmitted from the user interface assembly **14** to the fluid delivery device **10** using the intermediate transceiver **6600**.

[0499] Referring now to FIG. **113**, a plan diagram of a specific embodiment of an intermediate transceiver **6600** is shown. A short range transceiver **6610** communicates with a nearby fluid delivery device. The short range transceivers of the device and the intermediate transceiver **6600** may communicate using one or more of many protocols and transmission frequencies known to be useful for short range communication, e.g. radio frequency transmission. Data received by the intermediate transceiver **6600** is conveyed to a microprocessor **6630**, which may store the data in memory **6620** (e.g., a flash memory chip), and retrieve the data as needed. The microprocessor **6630** is also connected to a long range transceiver **6640**, which is in data communication with the user interface. For example, the intermediate transceiver **6600** and user interface assembly may operate on the Bluetooth standard which is a spread-spectrum protocol that uses a radio frequency of about 2.45 MHz and may operate over a distance of up to about 30 feet. The Zigbee standard is an alternative standard that operates in the ISM bands around 2.4 GHz, 915 MHz, and 868 MHz. However, any wireless communication could be used.

[0500] Optionally, the microprocessor **6630** analyzes received data to detect the presence of malfunctions or maintenance needs associated with the device. Some examples of fault conditions include, but are not limited to:

[0501] a lack of received data for a time period that exceeds a set limit;

[0502] a lack of data receipt confirmation signal from the device or the user interface assembly;

[0503] an overflow or near overflow condition of the appliance memory **6620**; low power;

[0504] overly high, low or improperly timed volume measurements received from the fluid delivery device **10**.

[0505] Based on this fault analysis, the microprocessor **6630** may trigger an alarm **6650** (e.g., a bell or buzzer). The microprocessor **6630** may also communicate an alarm condition to a remote device. The remote device may be, for example, the user interface assembly using the long range transceiver **6640**, the fluid delivery device **10** using the short range transceiver, or both the user interface assembly and fluid delivery device. Upon receiving an alarm signal, the user interface assembly may then relay the alarm signal over longer distances to a medical professional or patient guardian (e.g., by pager or telephone call or other methods of communication).

[0506] The power supply **6670** may be rechargeable, and may store sufficient energy to operate continuously for a period of time, for example, at least 10 hours. However, the operation time will vary based on use and device. The size of the fluid delivery device may be reduced so that it may easily be carried in a pocket, purse, briefcase, backpack or the like. One embodiment of the device includes a means to withstand routine shocks or spills. Additional features may be included in some embodiments, including, but not limited to, decorative features, or any of a wide range of consumer electronics capabilities such as the ability to play video games, send and receive instant messages, watch digital video, play music, etc. Third party controls may be included to remove or limit the use of such functions during some or all hours of the day. Alternately, the device may be as small and simple as possible, and only serve to repeat short range signals over a longer range. For example, the memory and analysis capability may be omitted.

[0507] Referring now to FIG. **114**, a data flow diagram for an embodiment of the system is shown. An intermediate transceiver **6600** is shown operating as a universal patient interface that engages in short range communication with multiple devices and relays information from those devices over a long range to one or more user interfaces associated with those devices. Examples of devices include wearable, implantable or internal medical devices including a fluid delivery system, a glucose sensor, a knee joint with an integrated strain sensor, an instrumented enteric probe in pill form, a defibrillator, a pacemaker, and other wearable therapeutic delivery devices. Since different types of devices and devices from different manufacturers may utilize differing short range communication standards and frequencies, the intermediate transceiver **6600** may include hardware (e.g., multiple antennas and circuitry), and software to support multiple protocols.

[0508] Battery Recharger

[0509] Referring now to FIGS. **115** and **116**. One embodiment of an apparatus is shown for recharging the battery **7100**. In FIG. **15**, the top, non-disposable portion of a fluid delivery device **2620** is shown disconnected from the base, disposable portion of a fluid delivery device. The battery recharger **7100** is used to recharge the battery (not shown) in the top **2620**. In FIG. **116**, the top **2620** is shown on the battery recharger **7100**. The latches **6530** are shown closed, connecting the top **2620** to the battery recharger **7100**. Thus, the latch **6530** used to connect a top portion **2620** to a base portion (not shown) is also used to connect the top **2620** to the battery recharger **7100**. Docking may establish a direct power connection, or power may be transferred by way of inductive coupling. Also, in some embodiments of the system, the patient employs multiple non-disposable portions **2620** in rotation; i.e., recharging one non-disposable portion **2620**, while using a second non-disposable portion (not shown).

[0510] The various embodiments described herein include different types and configurations of elements such as, for example, pump architectures, pump actuators, volume sensors, flow restrictors, reservoirs (and reservoir interfaces), sharps inserters, housings, latching mechanisms, user interfaces, on-board peripherals (e.g., controllers, processors, power sources, network interfaces, sensors), and other peripherals (e.g., hand-held remote controller, base station, repeater, filling station). It should be noted that alternative embodiments may incorporate various combinations of such elements. Thus, for example, a pump architecture described with reference to one embodiment (e.g., the pump shown and described with reference to FIGS. **15**A-**15**D) may be used with any of the various configurations of pump actuators (e.g., single shape-memory actuator with single mode of operation, single shape-memory actuator with multiple modes of operation, multiple shape-memory actuators of the same size or different sizes), and may be used in devices with various combinations of other elements (or absence of other elements) and/or any of the various flow restrictors.

[0511] Furthermore, while various embodiments are described herein with reference to a non-pressurized reser-